

Abstract

Electro-mechanical switches and memory cells using vertically-disposed nanofabric articles and methods of making the same are described. An electro-mechanical device, includes a structure having a major horizontal surface and a channel formed therein. A conductive trace is in the channel; and a nanotube article vertically suspended in the channel, in spaced relation to a vertical wall of the channel. The article is electro-mechanically deflectable in a horizontal direction toward the conductive trace. Under certain embodiments, the vertically suspended extent of the nanotube article is defined by a thin film process. Under certain embodiments, the vertically suspended extent of the nanotube article is about 50 nanometers or less. Under certain embodiments, the nanotube article is clamped with a conducting material disposed in porous spaces between some nanotubes of the nanotube article. Under certain embodiments, the nanotube article is formed from a porous nanofabric. Under certain embodiments, the nanotube article is electromechanically deflectable into contact with the conductive trace and the contact is either a volatile state or non-volatile state depending on the device construction. Under certain embodiments, the vertically oriented device is arranged into various forms of three-trace devices. Under certain embodiments, the channel may be used for multiple independent devices, or for devices that share a common electrode.